

PMP - Technical Meeting 3

Exercise: Event Study

Date due: Monday, 31 March

Instructions: Solve the following exercise using R. By March 31 (9 am) send your solutions as a single zip file named `TM3.GroupName.zip` to `gior-gia.simion@wu.ac.at`.

The zip should include the following files:

1. A pdf presentation including numerical results, comments, references, charts etc. It is very important to interpret your results and include comments in your presentation.
2. Your reproducible code (Rnw or R script).
3. The dataset used for the exercise.

Assignment: Perform an event study to measure stock price reactions to earning announcements. Following MacKinlay (1997), your task is to investigate the information content of these announcements and see if they provide information to the marketplace. To do so, you will compute abnormal returns, aggregate these returns over event observations and make statistical inference about them.

Data:

- Bloomberg: `HistoryEarningsTM3.xls` contains quarterly earnings announcements for the 30 firms in the Dow Jones Industrial Index. For each firm and quarter, the following information is provided: the ticker, the date of the announcement, the fiscal period, the fiscal period end, the actual reported earnings value, and a measure of the expected earnings, based on Consensus estimate values.¹
- Bloomberg: `StockPrices.TM3.RData` contains stock prices (total returns) for the 30 firms object of the analysis, for the Dow Jones Industrial Index and the S&P 500 Index.

¹If the reported and/or estimated values are missing, exclude that announcement.

Step 1: Assign each announcement to one of three categories based on the difference between the actual and the expected earnings: good news, no news, or bad news. If the actual exceeds expected by more (less) than 2.5 percent the announcement is classified as good (bad) news. The remaining ones are classified as no news.

For each event, estimate the abnormal return (AR) over the event window, as the difference between the realized and the normal return, $AR_{i,\tau} = R_{i,\tau} - E(R_{i,\tau}|\Omega_\tau)$. Note that the normal return, i.e. the return that would be observed if the event did not occur, is conditioned by the information set at time τ . Define $\tau = 0$ as the event date, $\tau = T1 + 1$ to $\tau = T2$ as the event window, and $\tau = T0 + 1$ to $\tau = T1$ as the estimation window. To calculate the normal return of a given security apply both the market model and the constant mean return model. For any security the market model is:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \epsilon_{i,t}$$

where $R_{i,t}$ and $R_{m,t}$ are the period t returns on security i and the market portfolio, respectively. $\epsilon_{i,t}$ is the zero mean disturbance term. Using OLS, obtain the market model parameters for the estimation window.

For a security with mean μ the constant mean return model is :

$$R_{i,t} = \mu_{i,t} + \zeta_{i,t}$$

where $R_{i,t}$ is the period t returns on security i and $\zeta_{i,t}$ the disturbance term, with expectation zero.

Step 2: Aggregate the individual securities' abnormal returns using $AR_{i,\tau}$ for each event period, $\tau = T+1, \dots, T2$. Given N events, the sample aggregated abnormal returns for period τ is:

$$\overline{AR}_\tau = \frac{1}{N} \sum_{i=1}^N AR_{i,\tau}$$

The average abnormal returns can then be aggregated over the event window. For any interval in the event window

$$\overline{CAR}(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} \overline{AR}_\tau$$

Step 3: Compute statistical inference about cumulative returns assuming that returns follow a normal distribution.

$$\overline{CAR}(\tau_1, \tau_2) \sim N[0, \text{var}(\overline{CAR}(\tau_1, \tau_2))]$$

Tasks:

1. Read the reference literature.
2. Implement the three above-mentioned steps to compute CARs for each announcement type (good, bad, no news) using both the market model and the constant mean return model (use log returns). For each announcement, use the 250 trading day period prior to the event window as the estimation window. The event window is $[-10,+10]$
3. Similarly to Table 1 in MacKinlay (1997) (pag. 22-23, MacKinlay, 1997) show in a table the AR and the CAR for a -10, +10 event window, relatively to the announcement day ($t=0$). AR is the sample average abnormal return for the specified day in event time and CAR is the sample average cumulative abnormal return for day -10 to the specified day. Construct the table for both the market model and the constant mean return model.
4. Plot cumulative abnormal returns from the market model from event -10 to the event day 10. The plot should show the CARs for each of the earnings news category.
5. Test the significance of the CARs for the following event windows: $[-10,+10]$, $[-5,+5]$, $[-2,+5]$, $[-1,+1]$, $[0,0]$. Report the results on a table. Discuss.
6. Redo the analysis using (instead of the market model) the Fama-French 5 factor model. ²
7. Discuss alternative statistics to test the significance of the abnormal returns.
8. Briefly discuss advantages and disadvantages of the event study approach.

Literature

MacKinlay, A. (1997). Event Studies in Economics and Finance. *Journal of Economic Literature*, 35(1), 13-39.

Campbell John, Lo Andrew, MacKinlay, A. and Whitelaw, Robert. (1998). The Econometrics of Financial Market. *Macroeconomic Dynamics*. 2. 559-562.

²You can download the factors from Kenneth R. French - Data Library.